Eye motion analysis in Chado, the way of tea

Minako Iue1), Toru Ota1), Kanako Hamasaki1), Masashi Kume1), Yasuyuki Yoshida1), Asami Nakai1), Natsumi Sasaoka2) Akihiko Goto2)

1) Kyoto Institute of Technology, Future Applied Conventional Technology Center
2) Osaka Sangyo University

The Way of tea is Japan’s representing unification of traditional culture which has been handed over mainly by word of mouth within the schools of the ways over 400 years. By analyzing the eye motion of the performance of tea, the system of performance and the reason of beauty of the Way of tea may be found. In order to obtain data for eye motion analysis, the comparative experiment of the beginner and the expert of the way of tea is taken place, and obtained data is analyzed by computer. The results show the difference of eye motion of the beginner and the expert in the way of tea.

Key Words: Eye motion, Motion analysis, The Way of tea, Japanese tradition

1. Introduction

“Chado”, the way of tea is traditional Japanese culture which is the unification of Japanese art, established in 16th century. “Temae” is performance of the host to present a bowl of tea following the strictly determined method. Amongst the flow of Temae, “Fukusa Sabaki”, the motion of folding a silk cloth for purification, is one of the highlights of the tea ceremony. The host folds a silk cloth in a certain way with which to purify utensils in front of the guests. For studying the way of tea, this Fukusa Sabaki is the basic skill to learn. However, this important method of Temae has been handed over generations to generations mainly by oral instructions. The details of the way have not yet been described scientifically. Therefore, the scientific analysis is highly valuable for handing over this traditional culture for future.

This experiment is to analyze the eye motion of the host when she folds a silk cloth for Fukusa Sabaki. People get most information from eyes. Visual information is highly important for making actions. Therefore, by analyzing the eye movement, the difference of the quality of Temae between the beginner and the expert can be described. Also, through this experiment, the reason of beauty of the way of tea may be explored.

2. Experimental Method

2-1 Subjects:
1. Female. Experienced tea master(expert) with 15 years of experience and has a license to teach.
2. Female. Beginner with 3 years of experience.

Each subjects performed tea ceremony one by one, and their eye movements were captured by CCD camera, and then the obtained data was analyzed by a software.

2-2 Experimental equipment:

Talk Eye II with CCD camera(30Hz), Made by Takei Kiki Kogyo. The glasses have a camera in the middle to capture the sight of the subject, and two cameras one on the right and one on the left to capture the eye movement of the subject.

2-3 Location:

Proper tea room where one can perform tea ceremony. The tea ceremony is performed on the Tatami mats. Each Tatami mats in the tea ceremony room have functions and the Tatami where the subjects perform Temae is called Temae-za. The location to sit is strictly determined by the rule and the space between the subject and the Mizusashi, the fresh water container is always 16 Tatami weaves, or about 25 cm. This determined measurement of the position of the performance gives the constant condition for the subjects for this experiment.

2-4 Sectioning:

The method of Fukusa Sabaki is as follows. It can be divided into 7 sections:
I. Pick up Fukusa with the left hand
II. Hold the folded Fukusa in triangular shape with both hands in front of the body and make a pose ‘Kamae’.
III. Hold the Fukusa vertically near left thigh to fold it into three layers.

IV. Fold Fukusa again into two and hold it with the left hand.

V. Keep Fukusa in front of the body and fold it to half with the right hand.

VI. Hold Fukusa with the right hand and fold it again into half with the left hand in front of the body. Now Fukusa is folded into 8 layers.

VII. Hold completely folded Fukusa with the right hand. Ready to purify the utensils.

3. Results and Discussion

3-1 Length of focusing

There are 3 points in a complete period of Fukusa Sabaki where both the expert and the beginner are focusing on, which are section II, IV, and V. Section II is to hold the folded Fukusa in triangular shape with both hands in front of the body and make a pose ‘Kamae’. This is a highlight of Fukusa Sabaki, therefore, the performance should be carefully done regardless the length of experience. Section IV is to fold Fukusa again into two and hold it with the left hand. This part is a transitional action that Fukusa is moving from the left side of the body to the center of the body. Careful attention is required to folding Fukusa in moving the performing area of the hands. And section V is to keep Fukusa in front of the body and fold it to half with the right hand.

On the other hand, there are 2 sections where the significant difference is seen in between the beginner and the expert, which are section I and III. Section I is to pick up Fukusa with the left hand. Section III is to Hold the Fukusa vertically near left thigh to fold it into three layers.

In both sections, data shows that the expert didn’t focus anywhere at all. The length to gaze at the object was shown in (msec), the score of the expert were zero on both section I and III.

This indicates that the expert is performing without watching Fukusa when Fukusa is not right in front of the body. This is because she can perform without the information from eyes and she chose to see all around the Temaeza, checking the environment to obtain as much information of the entire situation as possible, rather than to gaze at the Fukusa all the time. Also, this indicates that expert is not turn her head towards the object, and stay still on the neutral position, which is to sit straight towards the center of Temaeza.

3-2 Velocity of moving eyes

The expert’s eye motion is much faster than the beginner’s. Velocity is shown in (deg/sec), and the expert’s eye motion counts up to 80 deg/sec, whereas the beginner’s counts up to 20 deg/sec.

It is because the expert is trying to get as much information as possible in a certain period of time.

Both beginner and expert’s velocity is higher in V sections as follows; Section II, III, IV, V and VI. They both are paying attention at the certain point and when the each action ends, velocity gets lower which means that both expert and beginner have same tendency regarding the velocity.

However, there is a difference in one part. Only the expert marked high score of velocity of moving eyes at the end of section II. This is the moment that Kamae is taken place, the peak of the highlight of Fukusa Sabaki. When Kamae is done, it looks as if the motion is stopped for a moment, Fukusa is right in front of the body and length of focusing is long. Velocity of expert is as high as 65 deg/sec at this moment, which means that although the motion looks still and the expert is looking at Fukusa, she is checking Fukusa itself from left to right, top to bottom carefully.

Fig. 1. Length of focusing

Fig. 2. Velocity of moving eyes